REMARKS

The Office Action dated December 17, 2004 has been carefully reviewed and the foregoing amendment and following remarks are made in consequence thereof.

Claims 1-6 and 8-20 are pending in this application. Claims 1-6 and 8-20 stand rejected.

The rejection of Claims 1-4, 6, 8-11, and 15-17 under 35 U.S.C. § 103 as being as being unpatentable over Schilling et al. in view of Briesch is respectfully traversed.

Schilling et al. describe a multiple annular combustion apparatus 25. Combustor apparatus 25 includes a domed end 35 that includes a plurality of domes 37, 39, and 41. Each dome 37, 39, and 41 includes a plurality of spaced openings that receive mixers for mixing air and fuel prior to entry into a common combustion chamber 29.

Joshi et al., which is incorporated by reference into Schilling et al., describe a duel fuel mixer 24 for use with a single domed combustor 10. Mixer 24 includes a swirl cup 22 and inner and outer swirlers 26 and 28, respectively. Mixer 24 is in flow communication with gas fuel passages 38 and a liquid fuel manifold 40. Swirlers 26 and 28, and gas fuel manifold 35 and liquid fuel manifold 40 are sized to permit a lean premixture at exit plane 43 of mixer 24. Joshi et al. also describe that a centerbody 49 in mixer 24 includes a passage 51 therethrough in order to admit air of a relatively high axial velocity into combustion chamber 14 adjacent centerbody tip 50.

Briesch describes a gas turbine power plant having a heat recovery steam generator that generates steam at high and low pressures. The high pressure steam, which is superheated, is partially expanded in a steam turbine, thereby producing shaft power. All of the partially expanded steam is then combined with low pressure steam. The combined steam flow is superheated and then injected into the combustor of the gas turbine to increase power output and reduce NOx. The steam injection may be accomplished by mixing the steam 88 into the compressed air 27 prior to its introduction into the combustor 10--for example, by introducing it into the fuel nozzle. Alternatively, the steam 88 may be injected directly into the primary combustion zone of the combustor 10.

Claim 1 recites a method for operating a gas turbine combustor of a gas turbine engine using a water delivery system wherein the combustor includes a plurality of domes and the water delivery system is connected to the gas turbine engine wherein the method includes "supplying at least one combustor dome with a fuel/air mixture equivalence ratio less than one...supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody."

To the extent understood, none of Schilling et al./Joshi et al. nor Briesch, considered alone or in combination, describe nor suggest the claimed combination, and as such, the presently pending claims are patentably distinguishable from the cited combination. Specifically, none of Schilling et al./Joshi et al. or Briesch, considered alone or in combination, describe or suggest a method for operating a gas turbine combustor including supplying at least one combustor dome with a fuel/air mixture equivalence ratio less than one and supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of atomized water and steam is injected through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Rather, in contrast to the present invention, Shilling et al. describe a combustor that includes premixers, Joshi et al. specifically describe a combustor that includes swirlers and fuel manifolds that are sized to discharge a predetermined lean premixture into the combustor, and Briesch describes mixing the steam into the air prior to its introduction into the combustor, for example, by introducing steam into the fuel nozzle or injecting the steam directly into the primary combustion zone of the combustor, but none of Schilling et al./Joshi et al. nor Briesch describe or suggest injecting steam or atomized water through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Schilling et al./Joshi et al. in view of Briesch.

Additionally, Applicants submit that the obviousness cannot be established by merely suggesting that it would have been obvious to one of ordinary skill in the art to modify

Schilling et al./Joshi et al. using the teachings of Briesch. More specifically, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

None of Schilling et al./Joshi et al. or Briesch, considered alone or in combination describe or suggest the claimed combination, and Applicants respectfully submit that it would not be obvious to combine Schilling et al./Joshi et al. and Briesch because no reasonable expectation of success has been shown. Although Schilling et al. and Joshi et al. describe premixing fuel and air and Joshi et al. also describe premixing fuel and air at an equivalence ratio less than one, neither Schilling et al. nor Joshi et al. describe or suggest that premixing fuel and air at an equivalence ratio less than one may be used together with water and/or steam injection into a combustor. Rather, at column 1, lines 47-49, Joshi et al. recite that "flame stability and engine operability dominate combustor design requirements." Briesch describes steam injection reduces the concentration of nitrogen oxides in the exhaust gas that is ultimately discharged to atmosphere, but Briesch does not describe or suggest that premixing fuel and air at an equivalence ratio less than one may be used together with water and/or steam injection into a combustor. Applicants respectfully submit it is not obvious to combine techniques, such as operating a combustor with an equivalence ratio that is less than one and injecting steam/water into the combustor, as both techniques have a tendency to reduce flame stability, especially in light of the fact within the cited prior art that "flame stability and engine operability dominate combustor design requirements."

Moreover, Briesch describe mixing the steam into the compressed air, from the compressor, prior to its introduction into the combustor by introducing the steam into the fuel nozzle or injecting the steam directly into the primary combustion zone of the combustor, which is in contrast to Claim 1 wherein at least one of atomized water and steam is injected through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Accordingly, Applicants respectfully submit it is not obvious to combine techniques which each have a tendency to reduce flame stability when the cited prior art states that the

combustor must be able to operate in a stable manner over a wide range of gas turbine cycle conditions.

Accordingly, Applicants respectfully submit that the prior art teaches away from the present invention and from each other. More specifically, Schilling et al. and Joshi et al. describe premixing fuel and air and Joshi et al. describes operating with an equivalence ratio less than one, which, by itself, tends to reduce flame stability. Moreover, Briesch describes mixing steam into the air prior to its introduction into the combustor by introducing it into the fuel nozzle or injecting the steam directly into the primary combustion zone of the combustor, either of which, by themselves, tends to reduce flame stability. Because each of Schilling et al./Joshi et al., and Briesch describe using emission lowering techniques that each have a tendency to reduce flame stability, and because flame stability and engine operability dominate combustor design requirements, and because the combustor must be able to operate in a stable manner over a wide range of gas turbine cycle conditions, Applicants respectfully submit that Schilling et al./Joshi et al. teach away from Briesch.

The contradictory teachings between the cited art would seem to indicate that one skilled in the art would not have combined the cited art to arrive at the present claimed invention because the prior art warns of the possibility of affecting flame stability using each of the techniques. Moreover, Applicants respectfully submit that one skilled in the art would not have combined the cited art but instead, would have avoided combining separate techniques that may adversely affect flame stability. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Schilling et al./Joshi et al. in view of Briesch.

Claims 2-4 depend from independent Claim 1. When the recitations of Claims 2-4 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-4 likewise are patentable over Schilling et al./Joshi et al. in view of Briesch.

Claim 6 recites a combustor system for a gas turbine engine, wherein the combustor system comprises "a combustor comprising a plurality of domes, at least one of said combustor domes configured to operate with a fuel/air mixture equivalence ratio less than one...a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are

only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody." None of Schilling et al./Joshi et al. or Briesch, considered alone or in combination, describe nor suggest a combustor system for a gas turbine engine that includes a combustor dome that is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination a water delivery sub-system configured to supply at least one of atomized water and steam injected through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Specifically, none of Schilling et al./Joshi et al. or Briesch, considered alone or in combination, describe or suggest a combustor system for a gas turbine engine including a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of atomized water and steam injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Accordingly, Applicants respectfully submit that Claim 6 is patentable over Schilling et al./Joshi et al. in view of Briesch.

Claims 8-11 depend from independent Claim 6. When the recitations of Claims 8-11 are considered in combination with the recitations of Claim 6, Applicants submit that dependent Claims 8-11 likewise are patentable over Schilling et al./Joshi et al. in view of Briesch.

Claims 15-17 depend from Claim 14 which recites a gas turbine engine comprising a combustor system comprising a combustor and a water delivery sub-system...said combustor being a lean premix combustor comprising a plurality of domes...at least one of said domes configured to operate with a fuel/air mixture equivalence ratio less than one...said water delivery sub-system configured to supply at least one of water and steam to the gas turbine engine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody." None of Schilling et al./Joshi et al. or Briesch, considered alone or in combination, describe nor suggest a gas turbine engine including a combustor system including a combustor that includes a combustor and a water delivery sub-

system, wherein the combustor includes a plurality of domes such that at least one of the domes is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination with a water delivery sub-system configured to supply at least one of water and steam to the gas turbine engine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Specifically, none of Schilling et al./Joshi et al. nor Briesch, considered alone or in combination, describe or suggest operating a combustor wherein at least one of atomized water and steam is injected into the combustor through a center orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Accordingly, Applicants respectfully submit that Claim 14 is patentable over Schilling et al./Joshi et al. in view of Briesch.

Claims 15-17 depend from independent Claim 14. When the recitations of Claims 15-17 are considered in combination with the recitations of Claim 14, Applicants submit that dependent Claims 15-17 likewise are patentable over Schilling et al./Joshi et al. in view of Briesch.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-4, 6, 8-11, and 15-17 be withdrawn.

The rejection of Claims 5, 12-14, and 18-20 under 35 U.S.C. § 103 as being unpatentable over Schilling et al. in view of Briesch, and further in view of Talabisco et al. is respectfully traversed.

Schilling et al. and Briesch are described above. Talabisco et al. describe a method and apparatus for maintaining a constant level of NO_x and minimizing CO emissions from a gas turbine. The turbine includes a compressor 12 and a combustor 14. Fuel, air, and steam is injected into combustor 14 based on a load of the turbine.

Claim 1 recites a method for operating a gas turbine combustor of a gas turbine engine using a water delivery system wherein the combustor includes a plurality of domes and the water delivery system is connected to the gas turbine engine wherein the method includes "supplying at least one combustor dome with a fuel/air mixture equivalence ratio

less than one...supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody."

To the extent understood, none of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination, describe nor suggest the claimed combination, and as such, the presently pending claims are patentably distinguishable from the cited combination. Specifically, none of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination, describe or suggest a method for operating a gas turbine combustor using a water delivery system, wherein the combustor includes a plurality of domes, and the water delivery system is connected to the gas turbine engine, in combination with method steps of supplying at least one combustor dome with a fuel/air mixture equivalence ratio less than one and supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody. Specifically, none of Schilling et al./Joshi et al., Briesch, nor Talabisco et al., considered alone or in combination, describe or suggest supplying at least one of water and steam into the gas turbine engine with the water delivery system such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Rather, in contrast to the present invention, Shilling et al. describe a combustor that includes premixers, Briesch describes mixing steam into the air prior to its introduction into the combustor by introducing it into the fuel nozzle or injecting the steam directly into the primary combustion zone of the combustor, and Talabisco et al. describe a system for automatically adjusting input steam flow rate based on a load of the turbine. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Schilling et al./Joshi et al. in view of Briesch, and further in view of Talabisco et al.

Notwithstanding the above, none of the cited art, considered alone or in combination describe or suggest all the elements of the claimed combination. Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been an obvious to one of ordinary skill in the art to modify Schilling et al./Joshi et al. according to the teachings of Briesch, and also using the teachings of Talabisco et al. More specifically, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination describe or suggest the claimed combination, and Applicants respectfully submit that it would not be obvious to combine Schilling et al. with Briesch and Talabisco et al. because there is no reasonable expectation of success shown for the combination in the cited art. Although Schilling et al. describe premixing fuel and air, Schilling et al. do not describe or suggest that premixing fuel and air at an equivalence ratio less than one may be used together with water and/or steam injection into a combustor. Rather, Joshi et al., which is incorporated into Schilling et al. by reference, at column 1, lines 47-49 recite that "flame stability and engine operability dominate combustor design requirements." Briesch describes that steam injection reduces the concentration of nitrogen oxides in the exhaust gas that is ultimately discharged to atmosphere, and Talabisco et al. describe fuel, air, and steam are injected into a combustor based on a load of the turbine for maintaining a constant level of NOx and minimizing CO emissions from a gas turbine, but none of Schilling et al./Joshi et al., Briesch, or Talabisco et al. describe or suggest that premixing fuel and air at an equivalence ratio less than one may be used together with water and/or steam injection into a combustor. Applicants respectfully submit it is not obvious to combine techniques, such as operating a combustor with an equivalence ratio that is less than one and injecting steam/water into the combustor, as both techniques have a tendency to reduce flame stability, especially in light of the fact stated within the cited prior art that flame stability and engine operability dominate combustor design requirements.

Moreover, Briesch describe mixing the steam into the compressed air, from the compressor, prior to its introduction into the combustor by introducing the steam into the fuel nozzle or injecting the steam directly into the primary combustion zone of the combustor, which is in contrast to Claim 1 wherein at least one of atomized water and steam is injected through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at

least one of atomized water and steam are only mixed downstream from the centerbody. Accordingly, Applicants respectfully submit it is not obvious to combine techniques which each have a tendency to reduce flame stability when the cited prior art states that the combustor must be able to operate in a stable manner over a wide range of gas turbine cycle conditions.

Accordingly, Applicants respectfully submit that the prior art teaches away from the present invention and from each other. More specifically, Schilling et al. and Joshi et al. describe premixing fuel and air and Joshi et al. describes operating with an equivalence ratio less than one, which, by itself, tends to reduce flame stability. Moreover, Briesch and Talabisco et al. each describe combustors that may utilize water injection, which, by itself, tends to reduce flame stability. Because each of Schilling et al., Joshi et al., Briesch and Talabisco et al. describe using emission lowering techniques that each have a tendency to reduce flame stability, and because flame stability and engine operability dominate combustor design requirements, and because the combustor must be able to operate in a stable manner over a wide range of gas turbine cycle conditions, Applicants respectfully submit that Schilling et al. and Joshi et al. teach away from Briesch and Talabisco et al. Combining two techniques that each tend to reduce flame stability when the cited prior art states that flame stability dominates combustor design is simply not an obvious combination.

The contradictory teachings between the cited art would seem to indicate that one skilled in the art would not have combined the cited art to arrive at the present claimed invention because the prior art warns of the possibility of affecting flame stability using each of the techniques. Moreover Applicants respectfully submit that one skilled in the art would not have combined the cited art, but instead would have avoided combining separate techniques that may adversely affect flame stability. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Schilling et al. in view of Briesch and further in view of Talabisco et al.

Claim 5 depends from independent Claim 1. When the recitations of Claim 5 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 5 likewise is patentable over Schilling et al. in view of Briesch and further in view of Talabisco et al.

Claims 12 and 13 depend from Claim 6 which recites a combustor system for a gas turbine engine, wherein the combustor system comprises "a combustor comprising a plurality of domes, at least one of said combustor domes configured to operate with a fuel/air mixture equivalence ratio less than one...a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody. None of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination, describe nor suggest a combustor system for a gas turbine engine, wherein the combustor system includes a combustor including a plurality of domes, wherein at least one of the combustor domes is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination a water delivery sub-system connected to the gas turbine engine and configured to supply at least one of water and steam to the gas turbine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Specifically, none of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination, describe or suggest operating a combustor wherein at least one of water and steam is supplied to the gas turbine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Accordingly, Applicants respectfully submit that Claim 6 is patentable over Schilling et al./Joshi et al. in view of Briesch, and further in view of Talabisco et al..

Claims 12 and 13 depend from independent Claim 6. When the recitations of Claims 12 and 13 are considered in combination with the recitations of Claim 6, Applicants submit that dependent Claims 12 and 13 likewise are patentable over Schilling et al./Joshi et al. in view of Briesch, and further in view of Talabisco et al.

Claims 18-20 depend from Claim 14 which recites a gas turbine engine comprising a combustor system comprising a combustor and a water delivery sub-system...said combustor being a lean premix combustor comprising a plurality of domes...at least one of said domes

configured to operate with a fuel/air mixture equivalence ratio less than one...said water delivery sub-system configured to supply at least one of water and steam to the gas turbine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody wherein the orifice extends through the centerbody substantially coincident with a longitudinal axis of the centerbody."

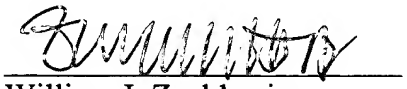
None of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination,, describe nor suggest a gas turbine engine including a combustor system including a combustor that includes a combustor and a water delivery sub-system, wherein the combustor includes a plurality of domes such that at least one of the domes is configured to operate with a fuel/air mixture equivalence ratio less than one, in combination with a water delivery sub-system configured to supply at least one of water and steam to the gas turbine such that at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. Specifically, none of Schilling et al./Joshi et al. Briesch, nor Talabisco et al., considered alone or in combination, describe or suggest operating a combustor wherein at least one of atomized water and steam is injected into the combustor through an orifice in a fuel/air premixer centerbody such that the fuel/air mixture and the at least one of atomized water and steam are only mixed downstream from the centerbody. For the reasons set forth above, Claim 14 is submitted to be patentable over Schilling et al./Joshi et al. in view of Briesch, and further in view of Talabisco et al.

Claims 18-20 depend from independent Claim 14. When the recitations of Claims 18-20 are considered in combination with the recitations of Claim 14, Applicants submit that dependent Claims 18-20 likewise are patentable over Schilling et al./Joshi et al. in view of Briesch, and further in view of Talabisco et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 5, 12-14, and 18-20 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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